

d. Remarks

Restriction Requirement at page 2, Sec. Nos. 1 – 3, of Office Action

Applicants confirm their election to prosecute claims 1 – 15, i.e., Group I at page 2 of the Office Action.

5 Amendments to Specification

At page 2, after line 29, the insertion is, e.g., supported by original claims 13 and 15.

Between page 12, line 12, and page 13, line 2, replacements of “84-86” by --84, 85, 86-- are supported by the fact that “84-86” in the original specification referred to
10 reference numerals “84 to 86” of Figure 5A.

At page 13, line 9, the insertion -- including electrodes 84, 85, 86-- conforms the specification to Figure 5B. The insertion is also supported at page 13, lines 7 – 9; page 12, lines 12 – 13, 19 – 20.

Amendments to Claims

15 The amendment to claim 1 is, e.g., supported by Figures 2 – 3.

The amendment to claim 2 is, e.g., supported at page 10, lines 21 – 22, 28 – 31; page 11, line 1.

The amendment to claim 8 is, e.g., supported by Figure 5A.

New claim 21 is, e.g., supported by Figures 1 – 3.

20 New claim 22 is, e.g., supported by Figure 2.

New claim 23 is, e.g., supported by Figure 5A and between page 12, line 25, and page 13, line 2.

New claim 24 is, e.g., supported by Figure 5A.

Objection to Drawings 5A and 5B at page 3, Sec. No. 4, of Office Action

25 With respect to Figure 5A, the amended specification recites --electrodes 84, 85, 86-- between page 12, line 12, and page 13, line 2. For that reason, the objection to the presence of reference numeral “85” in Figure 5A should be withdrawn.

With respect to Figure 5B, the amended specification recites --including electrodes 84, 85, 86-- at page 13, line 9. For that reason, the objection to the presence of
30 reference numeral “85” in Figure 5B should be withdrawn.

Objections to specification at page 3, Sec. No. 5, of Office Action

With respect to claim 2, the specification, e.g., provides antecedent basis by:

5 [T]he effective refractive index seen by the portion of control wave in the modulator's dielectric is larger, e.g., by about 5 % to about 20 %, than the effective refractive index seen by the optical carrier wave inside the modulator.

Specification, page 10, line 29, to page 11, line 1.

The above 5 % larger case corresponds to a value of 1.05, i.e., 1.00 plus 5 % more, for the ratio of the effective refractive index seen by the control wave in dielectric of the
10 modulator to the effective refractive index seen by an optical carrier wave inside the modulator. The above 20 % larger case corresponds to a value of 1.20, i.e., 1 plus 20 % more, for the ratio of the effective refractive index seen by the control wave in dielectric of the modulator to the effective refractive index seen by an optical carrier wave inside the modulator. Thus, the above portion of the specification supports the range recited in
15 claim 2.

With respect to claim 14, the specification, e.g., provides antecedent basis by:

Thus, the average refractive index in the cladding layers 36, 38 is about 10 – 15 percent higher, at millimeter control wave wavelengths, than the refractive index of core layer 40, at the 1.3 micron optical carrier wave wavelength.

20 Specification, page 8, lines 17 – 20.

The 10 % larger case corresponds to a value of 1.10, i.e., 1 plus 10 % more, for the ratio of a refractive index of the cladding at a millimeter wavelength to a refractive index of one of the cores at the wavelength of 1.3 microns. The 15 % larger case corresponds to a value of 1.15, i.e., 1 plus 15 % more, for the ratio of the refractive index of the cladding
25 at a millimeter wavelength to the refractive index of the one of the cores at the wavelength of 1.3 microns. Thus, the above portion from the specification supports the range recited in claim 14.

With respect to claim 15, the specification provides antecedent basis, e.g., in the insertion made by amendment herein at page 2, after line 29.

Claim rejections under 35 U.S.C. § 112 at pages 3 – 4, Sec. No. 6, of Office Action

The Office Action rejects claims 1 and 8 under 35 U.S.C. § 112, 2nd par. “as being incomplete for omitting essential structural cooperative relationships of elements The structural relationship between the optical waveguide and the control waveguide”

5 Amended claims 1 and 8 recite that these waveguides are collinear and overlap and also that the optical waveguide has a refractive index responsive to electric fields produced by the control wave that the control waveguide is adapted to carry. Thus, a control wave that the control waveguide is adapted to carry produces an electric field in the optical waveguide, and a refractive index of the optical waveguide responds to said
10 control wave. These recited features of claims 1 and 8 provide a structural cooperative relationship between the control and optical waveguides. For this reason, Applicants request withdrawal of the rejection of claims 1 and 8 under U.S.C. § 112, 2nd par.

Claim rejections under 35 U.S.C. § 102 at pages 4 -7, Sec. No. 7, of Office Action

15 The Office Action rejects claims 1, 3, 4, 7 – 11 and 13 as being anticipated by U.S. Patent 6,198,855 (“Hallemeier”).

The rejections of claims 1 and 8 have not given weight to recitations in 3rd paragraphs therein, i.e., in wherein clauses of these claims. See also, Office Action, top of page 4. Applicants note that the wherein clauses of claims 1 and 8 do recite features that further limit elements of the claims. In claim 1, the wherein clause recites a relation
20 between the refractive index of the cladding layer at a wavelength that the control waveguide is adapted to carry, i.e., the control wave’s wavelength, and the refractive index of the core at a wavelength that the optical waveguide is adapted to carry, i.e., the optical carrier wave’s wavelength. The recited relation between these two refractive indexes is a limitation on the form of the optical waveguide. For that reason, the wherein
25 clause of claim 1 must be given patentable weight. In claim 8, the wherein clause recites a relation between the refractive index of the core at a wavelength that the control waveguide is adapted to carry, i.e., the control wave’s wavelength, and the refractive index of the cladding layer at the same wavelength. The recited relation between these two refractive indexes is also a limitation on the form of the optical waveguide. For that
30 reason, the wherein clause of claim 8 must be give patentable weight.

Furthermore, Hallemeier does not suggest the limitation in the wherein clause of either claim 1 or claim 8.

With respect to claim 1, Hallemeier does not disclose that “the refractive index of a cladding layer at the control wave’s wavelength is higher than the refractive index of the core at the optical carrier wave’s wavelength” as recited in claim 1. In contrast, at col. 7, lines 49 – 60, Hallemeier states that “[t]he substrate 68 has a dielectric constant which is higher than the dielectric constant ϵ of the buffer layer 76.” Neither the substrate 68 nor the buffer layer 76 is a core of an optical waveguide as in the wherein clause of claim 1. Figure 3 of Hallemeier shows optical waveguides as regions 58, 60, which are different from the substrate 68 and the buffer layer 76. The cores of optical waveguides are located in these regions 58, 60 rather than being the substrate 68 or the buffer layer 76. For that reason, Hallemeier inherently discloses a relation between refractive indexes that is unrelated to the relation between the refractive index of the core and cladding layer of an optical waveguide as recited in claim 1. Furthermore, Hallemeier does not teach the relation recited in the wherein clause of claim 1 between col. 5, line 66, and col. 6, line 2; at col. 6, lines 10 – 52; between col. 7, line 60, and col. 8, line 10; or in Fig. 1 or 3. For the above reasons, the Office Action has not provided a teaching from Hallemeier for each feature of claim 1. Claim 1 is thus, novel over Hallemeier.

With respect to claim 8, Hallemeier does not disclose that “the refractive index of the core at the control wave’s wavelength is lower than the refractive index of the cladding layer at the optical carrier wave’s wavelength” as recited in the wherein clause of claim 8. In contrast, at col. 7, lines 49 – 60, Hallemeier discloses that “[t]he substrate 68 has a dielectric constant which is higher than the dielectric constant ϵ of the buffer layer 76.” Neither the substrate 68 nor the buffer layer 76 is a core of an optical waveguide as in the wherein clause of claim 8. Figure 3 of Hallemeier shows optical waveguides as being regions 58, 60, which are not the substrate 68 or the buffer layer 76. Thus, Hallemeier inherently discloses a relation between refractive indexes that is unrelated to the relation between the refractive index of the core and cladding layer of an optical waveguide as recited in claim 8. Furthermore, Hallemeier does not teach the relation recited in the wherein clause of claim 8 between col. 5, line 66, and col. 6, line 2;

at col. 6, lines 10 – 52; between col. 7, line 60, and col. 8, line 10; or in Fig. 1 or 3. For the above reasons, the Office Action has not provided a teaching from Hallemeier for each feature of claim 8. Claim 8 is thus, novel over Hallemeier.

5 Dependent claims 3, 4, 7, and 9 – 11 are novel over Hallemeier, at least, by their dependence on novel claim 1 or on novel claim 8.

For similar reasons, Hallemeier does not suggest the limitation in the wherein clause of claim 13. In particular, the wherein clause of claim 13 recites a relation between the refractive index of one of the cores and the refractive index of the cladding. In contrast, at col. 7, lines 49 – 60, Hallemeier discloses a relation between refractive
10 indexes of substrate 68 and buffer layer 76. Since neither the substrate 68 nor the buffer layer 76 is a core of an optical waveguide, Hallemeier inherently discloses a relation between refractive indexes that is unrelated to the relation recited in claim 13. Furthermore, Hallemeier does not teach the relation recited in the wherein clause of claim 13 between col. 5, line 66, and col. 6, line 2; at col. 6, lines 10 – 52; or in Fig. 1 or 3. For
15 the above reasons, the Office Action has not provided a teaching from Hallemeier for each feature of claim 13. Claim 13 is thus, novel over Hallemeier.

Claim rejections under 35 U.S.C. § 103 at pages 7–11, Sec. Nos. 8 – 11, of Office Action

At page 7, the Office Action rejects claims 2, 14, and 15 as obvious over a combination of Hallemeier and U.S. Patent 5,649,045 (“Fjare”).

20 At page 10, the Office Action rejects claim 5 as obvious over a combination of Hallemeier and U.S. Patent 4,306,767 (“Kawachi”) and also rejects claim 6 as obvious over a combination of Hallemeier and U.S. Patent 5,076,658 (“Hayden”).

At page 11, the Office Action rejects claim 12 as obvious over a combination of Hallemeier, Kawachi, and Hayden.

25 Claims 2 and 5 – 6 are non-obvious, at least, by their dependence on non-obvious base claim 1.

Claim 12 is non-obvious, at least, by its dependence on non-obvious base claim 8.

Claims 14 – 15 are non-obvious, at least, by their dependence on non-obvious base claim 13.

Conclusion

For the above reasons, Applicants respectfully request allowance of claims 1 – 15 and 21 – 24 as currently amended.

5 No fee is believed due. In the event of any non-payment or improper payment of a required fee, the Commissioner is authorized to charge or to credit **Lucent Technologies Deposit Account No. 12-2325** to correct the error.

Respectfully,

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